IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s):	Amir Ben-Efraim; Tae Hae Nahm; David Hudson		
Assignee:	@ROAD, INC.		
Title:	Portable Browser Device with Voice Recognition and Feedback Capability		
Serial No.:	09/415,295	Filing Date:	October 8, 1999
Examiner:	Dinh, Khanh Q.	Group Art Unit:	2151
Docket No.:	1005.P001 US		

Irvine, California
March 17, 2006

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APPELLANT'S BRIEF

Dear Sir:

I. REAL PARTY IN INTEREST

The entire interest in the present application has been assigned to @Road, Inc., a California corporation having a place of business at 47071 Bayside Parkway, Fremont, California 94538, as recorded at reel 013124, frame 0415.

II. RELATED APPEALS AND INTERFERENCES

No other appeals or interferences are known to the appellant, the appellant's legal representative, or assignee which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

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Docket No.: 1005.P001 US

March 17, 2006

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Inventor(s):	Amir Ben-Efraim, Tae Hae Nahm, and David Hudson
Title:	PORTABLE BROWSER DEVICE WITH VOICE RECOGNITION AND FEEDBACK CAPABILTIY
Appln No.:	09/415,295
Filing Date:	October 8, 1999
Examiner:	**Dinh, Khanh Q.**
Art Unit:	**2151**

Enclosed herewith for filing is as follows:

1. This Transmittal Letter (in duplicate)
2. Appellant's Brief (27 pages)

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Respectfully submitted,

Mary Jo Bertani
Attorney for Applicant(s)
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Respectfully submitted,

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III. STATUS OF CLAIMS

Claims 1, 2, 4, 5, 8-18, 21, 23-30, 32-41, 43, 44, 86-89, and 94-98 are pending in the application.

Claims 1, 2, 4, 5, 8-18, 21, 23-30, 32-41, 43, 44, 86-89, and 94-98 are rejected under 35 U.S.C. 103(a).

The rejections of Claims 1, 2, 4, 5, 8-18, 21, 23-30, 32-41, 43, 44, 86-89, and 94-98 are on appeal.

IV. STATUS OF AMENDMENTS

No amendments were filed subsequent to the Final Office Action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Independent Claim 1 provides a mobile information network browser device (208) with audio feedback capability, as shown in FIG. 7. The information network (216) comprises a plurality of network servers (214), as shown in FIG. 2. The browser device comprises a wireless communication interface (700) (FIG. 7) operable to transmit data to a network server (214), and to receive data from the network server (214). An audio interface (702) is operable to receive data from the wireless communication interface (700). The data transmitted to the network servers (214) includes a request for information, and the data received from the network servers (214) includes information responsive to the request. An audio converter (734) is operable to receive the information responsive to the request, and to convert the responsive information to an audio signal (716-723). A car radio (726) and a short-range radio (728) are also included. The audio converter (734) outputs the audio signal (718) to the short-range radio (728), and the short-range radio (728) broadcasts the audio signal to a channel on the car radio (726) while the car radio is mobile as well as when the car radio is stationary. These aspects are described at least on page 13 line 26 through page 14 line 24 of the specification.

Independent Claim 24 provides a portable browser system (700, 904) with feedback capability for browsing an information network (216) that includes at least one data processor (740) in communication with a wireless communication network (202), as shown in FIG. 7. The at least

one data processor (740) is operable to execute first program instructions for receiving a user's input, second program instructions for requesting information from the information network, third program instructions for receiving responsive information from the information network, and fourth program instructions for transmitting the responsive information received from the information network. The browser system further includes a car radio (726) and an audio output device (726-733) operable to receive the responsive information from the data processor (740). The audio output device (726-733) is further operable to output the responsive information to the user in audio format. The audio output device (726-733) includes a short-range wireless radio (728). The audio converter (734) is operable to output the audio signal (718) to the short-range wireless radio (728). The short-range wireless radio (728) is operable to broadcast the audio signal to a channel on the car radio (726) while the car radio (726) is mobile as well as when the car radio (726) is stationary. A position-keeping system (900) (FIG. 9) is operable to determine the geographic location of the portable browser system (904). A location processor (1002) (FIG. 10) is operable to issue an alert when the portable browser system (904) is approaching an area where there is an incidence of wireless data communication loss greater than a pre-sclected threshold. These aspects are described at least on page 21 line 27 through page 23 line 28 of the specification.

Independent Claim 86 provides a mobile information network browser device (208) with audio feedback capability, the information network (216) comprising a plurality of network servers (214), the browser device (208) comprising a communication interface (700) operable to receive data from at least one of the network servers (214); a car radio (726); and a mobile audio device (208) operable to receive the data from the communication interface (700), the mobile audio device (208) being further operable to convert the data to an audio signal for output to the car radio (726) while the car radio (726) is mobile as well as when the car radio (726) is stationary. These aspects are described at least on page 13 line 26 through page 14 line 24 of the specification.

Independent Claim 94 provides a portable browser device (208) for browsing an information network (216) via wireless communication. As shown in FIG. 4, computer executable logic instructions receive a user's input (404); request information from the information network based on the user's input (406); receive responsive information from the information network (428); determine when the portable browser device is approaching an area where there is an incidence of wireless data communication loss greater than a pre-selected threshold; and buffer in a greater amount of the responsive information than usual before the portable browser device reaches the area

where there is an incidence of wireless data communication loss greater than a pre-selected threshold. These aspects are described at least on page 11 lines 4-15, page 12 lines 1-20, and page 23 lines 3-17 of the specification. The browser device further includes a car radio (726) and a transmitter (724, 728) to broadcast data based on the responsive information received from the information network for output on a channel of the car radio (726) while the car radio (726) is mobile as well as when the car radio (726) is stationary. These aspects are described at least on page 17 lines 1-28 of the specification.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 1, 2, 4, 5, 8-18, 21, and 23 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over Hitchings Jr. (hereafter Hitchings), U.S. Patent No. 6,594,484 in view of Logan *et al.* (hereafter Logan), US Patent No. 5,732,216.

2. Whether Claims 24-41, 43, and 44 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over Hitchings and Logan and further in view of Garceran *et al.* (hereafter Garceran), U.S. Patent No. 6,552,888.

3. Whether Claims 94-96 and 98 are unpatentable under 35 U.S.C. §103(a) as being unpatentable over Hitchings in view of Logan.

VII. ARGUMENT

1. Standard for Obviousness Rejections under 35 U.S.C. § 103(a)

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143. Failure to meet just one of the three prongs for the test of obviousness is sufficient to defeat rejection of the claims under 103(a).

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab*, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Lee*, 277 F.3d 1338, 1342-44, 61 USPQ2d 1430, 1433-34 (Fed. Cir. 2002) (discussing the importance of relying on objective evidence and making specific factual findings with respect to the motivation to combine references).

The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). Although a prior art device "may be capable of being modified to run the way the apparatus is claimed, there must be a suggestion or motivation in the reference to do so." 916 F.2d at 682, 16 USPQ2d at 1432.

A statement that modifications of the prior art to meet the claimed invention would have been "'well within the ordinary skill of the art at the time the claimed invention was made'"

because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a prima facie case of obviousness without some objective reason to combine the teachings of the references. *Ex parte Levengood*, 28 USPQ2d 1300 (Bd. Pat. App. & Inter. 1993). See also *In re Kotzab*, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1318 (Fed. Cir. 2000). (Court reversed obviousness rejection involving technologically simple concept because there was no finding as to the principle or specific understanding within the knowledge of a skilled artisan that would have motivated the skilled artisan to make the claimed invention).

In the present case, the cited references, alone and in combination, do not teach or suggest all the claim limitations, there is no motivation to combine the references, and there is no reasonable expectation of success.

2. Rejection of Claims 1, 2, 4, 5, 8-18, 21, and 23 under 35 U.S.C. § 103(a)

Claims 1, 2, 4, 5, 8-18, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hitchings Jr. (hereinafter Hitchings), U.S. Patent No. 6,594,484 in view of Logan *et al.* (hereinafter Logan), US Pat. No. 5,732,216.

2.a. Independent Claim 1

Independent Claim 1 recites:

> "A mobile information network browser device with audio feedback capability, the information network comprising a plurality of network servers, the browser device comprising:
> a wireless communication interface operable to transmit data to a network server, and to receive data from the network server;
> an audio interface operable to receive data from the wireless communication interface; wherein the data transmitted to the network server includes a request for information, and the data received from the network server includes information responsive to the request;
> an audio converter, the audio converter being operable to receive the information responsive to the request, the audio converter being further operable to convert the responsive information to an audio signal;
> a car radio; and
> a short-range radio co-located with the car-radio, wherein the audio converter outputs the audio signal to the short-range radio, the short-range radio

being operable to broadcast the audio signal to a channel on the car radio while the car radio is mobile as well as when the car radio is stationary."

Neither Hitchings or Logan, alone or in combination, disclose or suggest all the claim limitations including a portable browser device that includes a short range radio 728, a wireless communication interface 700, and a car radio 726 as set forth in Claim 1 and shown in FIG. 7 of the present disclosure. In contrast, FIG. 1 of Logan shows a modem 115 receiving signals from Internet Service Provider 121. The client CPU 105 outputs signals from the modem to a sound card 110. The description of the Logan device teaches that the radio link (117) can be used for communication between the Internet service provider 121 and PC client player 103. (Logan, col. 6 lines 36-48). There is no additional component in Logan that provides a short range radio link 728 between an audio converter 734 (sound card 110 in Logan) and a car radio 726 (computer player 103 in Logan). Additionally, there is no suggestion or teaching that the computer in Logan is configured with channels that enable a short-range radio to broadcast the audio signal to a channel on the car radio. Thus, neither Hitchings or Logan, alone or in combination, disclose or suggest all the limitations of Claim 1.

Additionally, there is no motivation to combine Logan and Hitchings for at least two reasons. First, Hitchings teaches away from using any device other than a cellular telephone to implement a wireless client device in order to maintain the size, weight, power requirements, usability, and mobility of the device, as well as to switch from one wireless network to another at any time without incurring additional cost to the carrier and providing the results of the service requests in a few seconds. (Hitchings Col. 5 lines 4-15, and Col. 12 lines 50-67.) Hitchings further states in Col. 5 lines 9-11 and Col. 12 lines 53-55 that a client device/cellular telephone is not a combination of a wireless communication module and a portable computer, as taught by Logan. (Logan Col. 6 lines 55-58). The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). The prior art cited in the present case does not suggest the desirability of the combination, but rather suggests the *undesirability* of the combination of the functions in Hitchings on a portable computer of Logan.

A second reason why there is no motivation to combine Hitchings with Logan is that Hitchings discloses a method and system for navigating a plurality of voice menu information systems using a display and input interface of a wireless client device. (Hitchings Col. 5 lines 34-37). The user selects a menu item, which causes a corresponding script to be executed to interact with the voice menu system. Following processing of the script, the user can receive the response via the on-line client device, or the response can be sent to a voice mailbox for later retrieval. (Hitchings, Abstract, and Col. 15 line 44 through Col. 16 line 4). Notably, the user of the Hitchings device can listen to the response directly from the client device. *Id.* Accordingly, there is no suggestion or motivation in Hitchings to provide alternative or additional means, such as a short-range radio being operable to broadcast the audio signal to a channel on the car radio as set forth in Claim 1, to listen to the response in lieu of Hitchings' goals of maintaining the size, weight, power requirements, usability, and mobility of the wireless client device. (Hitchings Col. 12 lines 50-67.)

The Examiner further states that the IRDA International standard provides interoperability among widely diverse systems in a car or on public transportation. (Advisory Action dated January 3, 2006). While Logan may state this capability of IRDA in Col. 6 lines 52-58 of the description, the IR signals cannot propagate through opaque barriers, leaving the signal confined to the room from which it originated. (See Evidence Appendix: Pavlosoglou *et al.*, "A Security Application of the Warwick Optical Antenna in Wireless Local and Personal Area Networks," School of Engineering, University of Warwick.) Accordingly, there is no reasonable expectation of success in utilizing Logan's IRDA connection to send signals to a device outside of the room in which the IRDA signals are generated, or to the mobile car radio while the vehicle is traveling because there would not be a direct line of sight between the transmitter and the receiver, as required by IRDA technology.

Thus, it would not be obvious to combine Hitchings with Logan for at least these reasons. Claim 1 is believed to be allowable over Hitchings and Logan, alone and in combination for at least the foregoing reasons.

Claims 2, 4-5, 8-18, 21, and 23 depend from Claim 1 and include features that further distinguish them from the prior art.

2.b. Dependent Claim 23

Claim 23 depends from Claim 1 and sets forth "a position-keeping system for providing the geographic location of the browser device to the network server via the wireless communication network, wherein the responsive information is based on the geographic location of the browser device." On page 7 of the Office Action, the Examiner cites Col. 9 lines 16-67 and Col. 14 line 21 to Col. 15 line 58 of the Hitchings reference as disclosing these features. Applicant has reviewed the cited portions of the Hitchings reference and respectfully asserts that the cited portions do not pertain to a position-keeping system that provides the location of the browser device, or responsive information that is based on the geographic location of the browser device. Applicant cannot find any portion of Col. 9 or any other portion of the Hitchings reference that pertains to "a position-keeping system for providing the geographic location of the browser device to the network server via the wireless communication network, wherein the responsive information is based on the geographic location of the browser device." The description in Col. 9 only teaches utility programs, data fields with information supplied by the user such as name and billing address, credit card information age, profession, sex, marital status, identification of subject matter of interest to the subscriber, and amount of advertising acceptable to the user.

In Col. 14 line 21 to Col. 15 line 58, Hitchings teaches various commands such as SKIP, BACK, MARK, and MENU that can be used to control playback of the program segments. Hitchings does not teach providing the geographic location of the browser device to the network server, nor is the responsive information in Hitchings based on the geographic location of the browser device. Claim 23 is therefore believed to be allowable over the Hitchings reference for at least these reasons.

3. Rejection of Claims 24-41, 43, and 44 under 35 U.S.C. § 103(a)

Claims 24-41, 43, and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hitchings and Logan and further in view of Garceran.

Independent Claim 24 includes:

"at least one data processor in communication with a wireless communication network

...

a car radio;

an audio output device operable to receive the responsive information from the data processor, the audio output device being further operable to output the responsive information to the user in audio format, wherein the audio output device includes a short-range wireless radio, the audio converter being operable to output the audio signal to the short-range wireless radio, the short-range wireless radio being operable to broadcast the audio signal to a channel on the car radio while the car radio is mobile as well as when the car radio is stationary".

Neither Hitchings or Logan, alone or in combination, disclose or suggest all the claim limitations including a short range radio, a data processor in communication with a wireless communication network, and a car radio as set forth in Claim 24. In contrast, FIG. 1 of Logan shows a modem 115 receiving signals from Internet Service Provider 121. The client CPU 105 outputs signals from the modem to a sound card 110. The description of the Logan device teaches that the radio link (117) can be used for communication between the Internet service provider 121 and PC client player 103. (Logan, col. 6 lines 36-48). There is no component in Logan that provides a short range radio link between an audio converter 734 (sound card 110 in Logan) and a car radio 726 (computer player 103 in Logan). Additionally, there is no suggestion or teaching that the computer in Logan is configured with channels that enable a short-range radio to broadcast the audio signal to a channel on the car radio. Thus, Logan does not teach or suggest all of the elements of Claim 24.

Additionally, there is no motivation to combine Logan and Hitchings for at least two reasons. First, Hitchings teaches away from using any device other than a cellular telephone to implement a wireless client device in order to maintain the size, weight, power requirements, usability, and mobility of the device, as well as to switch from one wireless network to another at any time without incurring additional cost to the carrier and providing the results of the

service requests in a few seconds. (Hitchings Col. 5 lines 4-15, and Col. 12 lines 50-67.) Hitchings further states in Col. 5 lines 9-11 and Col. 12 lines 53-55 that a client device/cellular telephone is not a combination of a wireless communication module and a portable computer, as taught by Logan. (Logan Col. 6 lines 55-58).

A second reason why there is no motivation to combine Hitchings with Logan is that Hitchings discloses a method and system for navigating a plurality of voice menu information systems using a display and input interface of a wireless client device. (Hitchings Col. 5 lines 34-37). The user selects a menu item, which causes a corresponding script to be executed to interact with the voice menu system. Following processing of the script, the user can receive the response via the on-line client device, or the response can be sent to a voice mailbox for later retrieval. (Hitchings, Abstract, and Col. 15 line 44 through Col. 16 line 4). Notably, the user of the Hitchings device can listen to the response directly from the client device. *Id.* Accordingly, there is no suggestion or motivation in Hitchings to provide alternative or additional means, such as a short-range radio being operable to broadcast the audio signal to a channel on the car radio as set forth in Claim 1, to listen to the response in lieu of Hitchings' goals of maintaining the size, weight, power requirements, usability, and mobility of the wireless client device. (Hitchings Col. 12 lines 50-67.)

The Examiner further states that the IRDA International standard provides interoperability among widely diverse systems in a car or on public transportation. (Advisory Action dated January 3, 2006). While Logan may state this capability of IRDA in Col. 6 lines 52-58 of the description, the IR signals cannot propagate through opaque barriers, leaving the signal confined to the room from which it originated. (See Evidence Appendix: Pavlosoglou *et al.*, "A Security Application of the Warwick Optical Antenna in Wireless Local and Personal Area Networks," School of Engineering, University of Warwick.) Accordingly, there is no reasonable expectation of success in utilizing Logan's IRDA connection to send signals to a device outside of the room in which the IRDA signals are generated, or to the mobile car radio while the vehicle is traveling because there would not be a direct line of sight between the transmitter and the receiver, as required by IRDA technology.

Thus, it would not be obvious to combine Hitchings with Logan for at least these reasons. Claim 24 is believed to be allowable over Hitchings and Logan, alone and in combination for at least the foregoing reasons.

Claims 25-41, 43, 44, and 98 depend from Claim 24 and include features that further distinguish them from the prior art.

4. Rejection of Claims 94-96 and 98 under 35 U.S.C. § 103(a)

Claims 94-96 and 98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hitchings in view of Logan and further in view of Garceran.

4.a. Independent Claim 94

Independent Claim 94 recites:

A portable browser device for browsing an information network via wireless communication comprising:
computer executable logic instructions operable to:
receive a user's input;
request information from the information network based on the user's input;
receive responsive information from the information network;
determine when the portable browser device is approaching an area where there is an incidence of wireless data communication loss greater than a pre-selected threshold; and
buffer in a greater amount of the responsive information than usual before the portable browser device reaches the area where there is an incidence of wireless data communication loss greater than a pre-selected threshold;
a car radio; and
a transmitter operable to broadcast data based on the responsive information received from the information network for output on a channel of the car radio while the car radio is mobile as well as when the car radio is stationary.

Garceran is cited as teaching a device that "buffer[s] in a greater amount of the responsive information than usual before the portable browser device reaches the area where there is an incidence of wireless data communication loss greater than a pre-selected threshold". Applicant respectfully disagrees. Garceran only teaches collecting location information at a higher rate when a wireless unit is near a hole in the RF coverage. (Garceran col. 9 lines 37-45). The location information is generated by the wireless unit and periodically sent to one or more base stations. (Garceran col. 9 lines 24-28). The location information is not equivalent to responsive information

of Claim 94 because the location information is not requested by the browser device (wireless unit) or received by the browser device (wireless unit) from the information network (base station). The wireless unit generates the location information and transmits the location information to the base station in Garceran, which is opposite to the request by the browser device and responsive information from the network of Claim 94.

Claim 1 requires "receive a user's input; request information from the information network based on the user's input; receive responsive information from the information network". In contrast, the location information in Garceran is not based on input from a user, but is generated automatically by the wireless unit. (Garceran col. 9 lines 5-23).

Claim 94 is believed to be allowable over Hitchings, Logan, and Garceran, alone and in combination, for at least these reasons. Claims 95-97 depend from Claim 94 and include features that further distinguish them from the prior art.

4.b. Dependent Claim 96

Claim 96 depends from Claim 94 and further "allow(s) the user to indicate whether to wait to transmit the responsive information to the car radio until reception improves." Garceran is cited as teaching this feature, however, the cited portions of Garceran teach a wireless unit that automatically changing coverage areas based on traffic loads, interference levels, and/or time of day. (Garceran col. 12 lines 12 through col. 13 line 60, and col. 14 lines 12-59). The teachings of Garceran are not equivalent to allowing a user to indicate whether to wait to transmit the responsive information until reception improves. Claim 96 is believe to be allowable for at least these reasons.

4.c. Dependent Claim 98

Claim 98 depends from Claim 24 and further "allow(s) the user to indicate whether to wait to transmit the responsive information to the car radio until reception improves." Garceran is cited as teaching this feature, however, the cited portions of Garceran teach a wireless unit that automatically changing coverage areas based on traffic loads, interference levels, and/or time of day. (Garceran col. 12 lines 12 through col. 13 line 60, and col. 14 lines 12-59). The teachings of Garceran are not equivalent to allowing a user to indicate whether to wait to

transmit the responsive information until reception improves. Claim 98 is believe to be allowable for at least these reasons.

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(Signature)

Jov C. Ngo
(Printed Name of Person Signing Certificate)

March 17, 2006
(Date)

Respectfully submitted,

Mary Jo Bertani

Mary Jo Bertani
Attorney for Applicant(s)
Reg. No. 42,321

VIII. CLAIMS APPENDIX

Claims remaining in the application are as follows:

1. (Previously presented): A mobile information network browser device with audio feedback capability, the information network comprising a plurality of network servers, the browser device comprising:

a wireless communication interface operable to transmit data to a network server, and to receive data from the network server;

an audio interface operable to receive data from the wireless communication interface; wherein the data transmitted to the network server includes a request for information, and the data received from the network server includes information responsive to the request;

an audio converter, the audio converter being operable to receive the information responsive to the request, the audio converter being further operable to convert the responsive information to an audio signal;

a car radio; and

a short-range radio, wherein the audio converter outputs the audio signal to the short-range radio, the short-range radio being operable to broadcast the audio signal to a channel on the car radio while the car radio is mobile as well as when the car radio is stationary.

2. (Original): The browser device, as set forth in claim 1, further comprising:

a voice interaction system operable to recognize commands from a user's speech input for interaction with the browser device including the request for information.

3. (Canceled)

4. (Previously presented): The browser device, as set forth in claim 2, wherein the audio converter outputs the audio signal to at least one audio speaker.

5. (Previously presented): The browser device, as set forth in claim 1, wherein the audio converter outputs the audio signal to a set of headphones.

6. (Canceled)

7. (Canceled)

8. (Previously presented): The browser device, as set forth in claim 1, wherein the audio converter outputs the audio signal to a cassette adapter.

9. (Previously presented): The browser device, as set forth in claim 1, wherein the audio converter outputs the audio signal to a data storage medium.

10. (Original): The browser device, as set forth in claim 2, further comprising:
a microphone for receiving the speech input from the user.

11. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for converting the responsive information from a text format to an audio format.

12. (Original): The browser device, as set forth in claim 11, wherein the first program instructions are loaded and executed in the network server.

13. (Original): The browser device, as set forth in claim 11, wherein the first program instructions are loaded and executed in the audio interface.

14. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for encrypting the user input prior to being transmitted to the wireless communication interface.

15. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for decrypting the responsive information.

16. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for compressing the user input prior to being transmitted to the wireless communication interface.

17. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for decompressing the responsive information.

18. (Original): The browser device, as set forth in claim 1, further comprising:
first program instructions for allowing the user to enter personal information to customize interaction with the browser device.

19. (Canceled)

20. (Canceled)

21. (Original): The browser device, as set forth in claim 1, further comprising:
an input buffer for storing the responsive information until the user commands the browser device to playback the responsive information.

22. (Canceled)

23. (Previously presented): The browser device, as set forth in claim 1, further comprising:
a position-keeping system for providing the geographic location of the browser device to the network server via the wireless communication network, wherein the responsive information is based on the geographic location of the browser device.

24. (Previously presented): A portable browser system with feedback capability for browsing an information network comprising:
at least one data processor in communication with a wireless communication network, the at least one data processor being operable to execute first program

instructions for receiving a user's input, second program instructions for requesting information from the information network, third program instructions for receiving responsive information from the information network, and fourth program instructions for transmitting the responsive information received from the information network;

a car radio;

an audio output device operable to receive the responsive information from the data processor, the audio output device being further operable to output the responsive information to the user in audio format, wherein the audio output device includes a short-range wireless radio, the audio converter being operable to output the audio signal to the short-range wireless radio, the short-range wireless radio being operable to broadcast the audio signal to a channel on the car radio while the car radio is mobile as well as when the car radio is stationary;

a position-keeping system operable to determine the geographic location of the portable browser system; and

a location processor operable to issue an alert when the portable browser system is approaching an area where there is an incidence of wireless data communication loss greater than a pre-selected threshold.

25. (Previously presented): The browser system, as set forth in claim 24, further comprising:

a voice interaction system operable to recognize commands from a user's speech input to interact with the browser system.

26. (Original): The browser system, as set forth in claim 24, further comprising:

an audio converter coupled to the audio output device, the audio converter being operable to receive the responsive information from the data processor, the audio converter being further operable to convert the responsive information to an audio signal for output to the audio output device.

27. (Original): The browser system, as set forth in claim 24, wherein the audio output device includes at least one audio speaker.

28. (Original): The browser system, as set forth in claim 24, wherein the audio output device includes a cassette adapter.

29. (Original): The browser system, as set forth in claim 24, wherein the audio output device includes a data storage medium.

30. (Original): The browser system, as set forth in claim 24, wherein the audio output device includes a set of headphones.

31. (Canceled)

32. (Original): The browser system, as set forth in claim 25, further comprising:
a microphone in communication with the voice interaction system for receiving the user's speech.

33. (Original): The browser system, as set forth in claim 25, further comprising:
a telephone in communication with the voice interaction system for receiving the user's speech input.

34. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for converting the responsive information from a text format to an audio format.

35. (Original): The browser system, as set forth in claim 34, wherein the fifth program instructions are loaded and executed in the network server.

36. (Original): The browser system, as set forth in claim 34, wherein the fifth program instructions are loaded and executed in the data processor.

37. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for allowing the user to enter personal information to customize interaction with the browser system.

38. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for encrypting the user input prior to being transmitted to the wireless communication network.

39. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for decrypting the responsive information.

40. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for compressing the user input prior to transmitting the user input to the wireless communication network.

41. (Original): The browser system, as set forth in claim 24, further comprising:
fifth program instructions for decompressing the responsive information.

42. (Canceled)

43. (Original): The browser system, as set forth in claim 24, further comprising:
an input buffer for storing the responsive information until the user commands the browser system to playback the responsive information.

44. (Original): The browser system, as set forth in claim 26, further comprising:
an input buffer for storing the responsive information until the audio converter processes it.

Claims 45-85 (Withdrawn)

86. (Previously presented): A mobile information network browser device with audio feedback capability, the information network comprising a plurality of network servers, the browser device comprising:
a communication interface operable to receive data from at least one of the network servers;
a car radio; and

a mobile audio device operable to receive the data from the communication interface, the mobile audio device being further operable to convert the data to an audio signal for output to the car radio while the car radio is mobile as well as when the car radio is stationary.

87. (Original): The browser device, as set forth in claim 86, wherein operation of the mobile audio device is controlled with voice commands.

88. (Original): The browser device, as set forth in claim 86, wherein operation of the mobile audio device is controlled with control switches.

89. (Original): The browser device, as set forth in claim 86, wherein the communication interface is operable to receive the data from a wireless communication network.

90-93. (Canceled)

94. (Previously presented): A portable browser device for browsing an information network via wireless communication comprising:

computer executable logic instructions operable to:

receive a user's input;

request information from the information network based on the user's input;

receive responsive information from the information network;

determine when the portable browser device is approaching an area where there is an incidence of wireless data communication loss greater than a pre-selected threshold; and

buffer in a greater amount of the responsive information than usual before the portable browser device reaches the area where there is an incidence of wireless data communication loss greater than a pre-selected threshold;

a car radio; and

a transmitter operable to broadcast data based on the responsive information received from the information network for output on a channel of the car radio while the car radio is mobile as well as when the car radio is stationary.

95. (Previously presented): The browser device, as set forth in claim 94, further comprising computer executable logic instructions operable to access a database of information regarding the incidence of data loss in an area.

96. (Previously presented): The browser device, as set forth in claim 94, further comprising computer executable logic instructions operable to allow the user to indicate whether to wait to transmit the responsive information to the car radio until reception improves.

97. (Previously presented): The browser device, as set forth in claim 94, further comprising an adapter plug insertable in an automobile cigarette lighter to supply power to the browser device.

98. (Previously presented): The browser system, as set forth in claim 24, wherein the browser system is further operable to allow the user to indicate whether to wait to transmit the responsive information to the car radio until reception improves.

XI. EVIDENCE APPENDIX

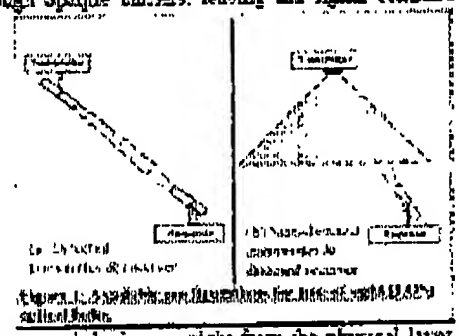
A Security Application of the Warwick Optical Antenna in Wireless Local and Personal Area Networks

I. Papadopoulos, R. Ramirez-Iniguez, M. S. Leeson and R. J. Green

Abstract: The objective of this paper is to propose an implementation utilising the Warwick optical antenna for securing wireless communications in a combined radio and infrared environment. By using the infrared channel as a protected medium for exchanging information, security can be maximised in any radio communication taking place in the local or personal area network, provided the correct methods are used.

1 Introduction.

One of the advantages of using infrared (IR) radiation as part of the physical medium for indoor wireless communications lies in the fact that infrared light, sharing many of the features of visible light, does not have the ability to propagate through opaque barriers, leaving the signal confined within the room from which it originated [1].



Thus, provided that our selection of the configuration for the wireless optical link is a line-of-sight (LOS), requiring an unhindered path between the two ends and either involving a directed transmitter, with a narrow beam radiation pattern (figure 1a), or a non-directed transmitter with a broad-beam radiation pattern (figure 1b) [2], any data exchange taking place can be targeted to, if not a single device, a limited number of devices closely located to each other.

From a security perspective, having the ability to target the data flow on the network to particular users and devices, straight from the physical layer, provides us with a great advantage towards any form of passive or active eavesdropping.

A malicious user, wanting to listen in to the information exchange between any two devices on the network (passive eavesdropping) or even cut and modify the data being sent (active eavesdropping) would have to satisfy either of the following two requirements:

- Be physically present within the line-of-sight (LOS) of the transmitter and receiver.
- Have the ability to fool the receiving party towards the origin of the received data.

Both these requirements take the burden of security in networks from the protocol and application layer to the concept of physical security. Information is no longer sent in a broadcast manner, leaving it to encryption and authentication procedures for securing any data exchange. Instead, the user is responsible for what data travels to what device, by means of pointing the transmitter towards the required receiving party.

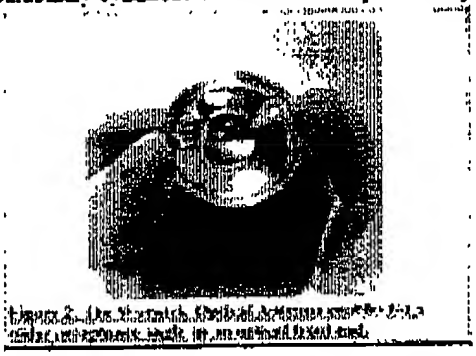
Today, infrared wireless links are used to bypass the encryption and authentication stages necessary for securing Radio Frequency (RF) communications [3], thus taking a huge weight of the network (in terms of traffic) and the device (in terms of processing power), allowing the secure data exchange in broadband channels without any further requirements other than a LOS between the sender and receiver.

For Local Area Networks (LANs) and Personal Area Networks (PANs), combining the security advantages of infrared, with the broadcast nature and connectivity of RF could provide a way of securing diverse communications (such as ad-hoc networking), taking place in a dynamic environment, where the number of devices and links may vary in time.

2. Utilising the Warwick optical antenna.

One of the most important parts in a wireless infrared receiver is the optical front end. By carefully designing and using an optical concentrator it is possible to increase the effective collection area of the receiver. Doing so enables us to improve on power, which in turn allows for an increase of the distance between the transmitter and receiver or a decrease in the receiver capacitance, thus allowing the use of smaller photo-detectors [4].

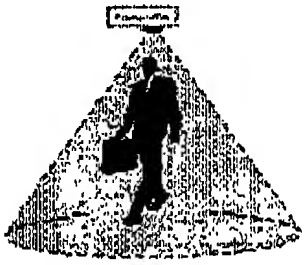
The Warwick optical antenna represents such a front end to an optical receiver. By using a rotationally-symmetric, dielectric totally internally reflecting concentrator (DTIRC) it is feasible to achieve concentrations close to the theoretical maximum limit. This is done by combining front surface refraction with total internal reflection from the sidewall. The idea originates from solar concentration [5], but it has been proven that DTIRCs work effectively in optical wireless receivers [6] as well.



The key advantage in using an optical receiver with a wider acceptance angle for securing wireless communications lies in the wider field-of-view (FOV) of the optical front end.

Positioned as shown in figure 3, typically at the physical entrance(s) of the area where the wireless LAN or PAN is operating, the infrared link can act as an alternative secure channel for data exchange prior to initialising an RF link with the network.

Hence, in a typical scenario, consider an office environment having wireless RF capabilities similar to those described in the IEEE 802.11x wireless LAN standard and a user with a portable device, such as a Personal Digital Assistant (PDA) or 3G mobile phone, having both wireless RF and infrared capabilities[1]. Since the devices in such an environment are not fixed, securing any data exchanged or providing means for authenticating users points as a very difficult task if we are to use RF all information is out in the open. As a result any attempt to exchange a secure key, that would enable us to use encryption algorithms for securing the data sent, can be easily eavesdropped.



By utilising an infrared link, located at the physical entrance of the wireless network, any user, as they enter the area, can exchange any number of keys using a secure channel, which can later on be used for authentication and encryption purposes.

The advantages of using an optical receiver with a wider acceptance angle lie mostly in an aspect security implementations tend to lag on that of human computer interaction. Using a simple LOS infrared link, would work just as well, but it would mean that users would have to probably queue for obtaining their secret key. Furthermore, depending on the position of the transmitter, which in turn defines the radius of the FOV, users can continue to move within the specified radius without affecting the handshake and data exchange between the transmitting and receiving end.

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[1] Such a scenario is not far from today's standards: Most mobile phones come equipped with IR links and RF connectivity is a matter of purchasing the appropriate expansion device. As for the network, a number of wireless LAN products based on the 802.11x standard, are available and in already widely in use.

3. Security overview.

Having briefly defined the requirements and motivation behind a physical layer implementation involving both IR and RF, it is time to question the security objectives behind such a system. In all communications, whether wired or wireless, data security can be seen as the superset of three attributes, all of which must be maintained [7]:

- **Integrity**
  Broadly speaking, integrity is compromised when unauthorised users are capable of modifying data. *"Has somebody improperly changed the data?"*
- **Secrecy**
  Of all three terms, secrecy is perhaps the easiest to understand. We all have secrets and can easily understand the effect of a leak. *"Has the data been improperly disclosed?"*
- **Availability**
  Data is only as good as your ability to use it. Denial-of-Service[4] (DOS) attacks are the most common threat to availability. *"Can I read my data when I want to?"*

In an RF network, all three of the above attributes are compromised. Since any message is transmitted throughout a general area, users have the ability to jeopardise both the integrity (by claiming a different origin) and secrecy (by listening to all messages sent) of the system. Availability is still a major issue, but very little extra weight is added to it from the fact that our communications are taking place using RF. Furthermore, if we can insure the first two attributes to be maintained, it becomes much harder for a DOS attack to be launched against the network.

By introducing a secure IR channel and deploying a strong encryption algorithm, devices which have never previously existed on the network (ad-hoc networking represents a typical case), now have the ability to communicate securely over radio, provided a valid key exchange previously takes place. Thus the aspect of secrecy can be maximised.

Having the ability to exchange a key securely also indirectly implies the ability to distinguish different users and devices between them. For this, a number of methods and algorithms exist [5].

Moreover, since portable devices have limited memory and processing power, but also have rapid growth for both, standardising security requirements can be seen as a drawback especially when this is done in hardware. With the above described system, all security considerations fall under the application layer, thus allowing for adjustments within the specification, without any alterations in the physical and Media Access Control (MAC) layer.

Finally, in designing such a network architecture there are two pitfalls that should be avoided. Firstly, a system is only as secure as its weakest link. When deciding on the protocol structure on which the encryption algorithm is going to be based on, it must be made certain that new flaws do not emerge. Issues involving key length, key re-usage and key generation must be clearly defined so that not to leave any security flaws. This was the case with the Wired Equivalent Privacy (WEP) security standard for the IEEE 802.11 Wireless LAN specification [10]. Despite the fact that a secure algorithm was deployed, misinterpretation of some cryptographic primitives led to an insecure standard.

Secondly, more closely related to the physical layer, is the issue of reflected rays from the contact surface. When an infrared beam comes in contact with any surface, some of the radiation will be absorbed from it and some reflected towards the surrounding environment. The reflected index of any material specifies the amount of radiation capable of escaping from absorption and refraction. Thus, as a final requirement for added security, materials with a low reflected index [11] should be placed in the final contact surface within the field of view of the optical antenna.

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[4] A Distributed DOS attack can be seen as an attack where a number of compromised systems attack a single target, therefore causing a Denial Of Service for users on the targeted system. The flood of incoming packets to the targeted system causes it not to be able to handle legitimate users, resulting in data inaccessibility. A paper by Samuel Todd providing more details can be found in [8].

4. Conclusions.

Due to the nature of wireless radio communications, it is very difficult to maintain a secure network structure. Issues such as data integrity and user authentication contradict the dynamic characteristics of the network, thus providing connectivity to any user in a number of different locations. Furthermore, having the ability to exchange information between two parties in a secure fashion comes in direct contrast with the broadcast behaviour of RF.

For this purpose, deploying an infrared link at the physical entrance(s) to the location of the network enables the user to exchange a key using a secure line-of-sight channel, which they can in turn use for RF connectivity. By utilising the Warwick optical antenna, such a key exchange can take place in a wider field-of-view, allowing the user to freely move within the pre-specified range.

Provided that a well-designed secure protocol for RF is used and also that any reflections of the optical signal can be minimised through the use of absorbent material, such a system can guarantee the secure exchange of information between different devices on the network, as well as provide methods of authenticating users.

Such a scenario does not only have applicability in an office environment, but can also be extended to a number of other circumstances where network security plays a vital role. From smart homes, to wireless campuses, anyone wishing to secure their radio communications only has to go through the process of exchanging a key by means of a combined infrared channel.

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X. RELATED PROCEEDINGS APPENDIX

None.